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# New food processing equipment

Aquaculture Department, Southeast Asian Fisheries Development Center

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# New food processing \_\_\_\_\_ \_\_\_\_\_ equipment

With the expansion of value-added products, machinery manufacturers have found the need to develop a greater variety of batter-and-breading equipment.

Developments have fallen on three basic categories: (1) predusters, (2) liquid enrobers, and (3) applicators for large-particle crumbs - the Japanese-style crumbs.

## **Pre-dusters**

The earlier forms of predusting equipment had simply to ensure the uniform application of dry batter powders.

The newer machines handle products on a continuous basis and also eliminate the transfer of dust to the atmosphere while ensuring a consistent, uniform coating.

Products enter the machine onto a bed of predust and pass below a shower of predust which may be adjusted by means of a gate and vibrating plate to control pick-up and ensure consistent coverage. This control minimizes the excess dust that has to be removed by air knives or vibrators thus reducing wastage.

The products are transferred smoothly within the machine to reduce damage while continuous filtration ensures the removal of lumps from the predust.

Modern predust often contains flavoring and seasoning ingredients making it even more essential to control dust in the work atmosphere.

## **Liquid enrobers**

The early forms of liquid enrobers consisted of single machines capable of applying thin batter to products on a continuous basis.

The industry found that two further machines had to be developed, one for the application of thick pumpable batters and the other for Tempura batters which contain raising agents and should not be pumped.

Continuous pumping removes the carbon dioxide and inhibits the characteristic "rise" of the batter.

Conventional pumpable batters are nor-

mally recirculated within the applicator or pumped continuously between a batter make-up system and the applicator.

Product enters the machine on a conveyor passing through a shallow batch of batter. Batter is also applied from above.

In the Tempura application machine, products enter onto a layer of Tempura batter. They are then submerged by a top conveyor ensuring complete enrobement. Excess batter is carefully blown off.

## **Applicators for large-particle crumbs**

The introduction of large-particle crumb has proved to be the greatest catalyst of the decade in coated product development. It has necessitated the development of special application machines to minimize breakdown and improve product quality.

The ultimate objective is to present a product with the surface area covered totally, retaining the crumb which when flash-fried gives the impression of spikes, with the higher part of the crumb browned to a darker color than the main body of the product.

The basic principle in the design of breading machines is the recirculation of the crumb to provide a bottom bed as well as a top flow so as to completely encapsulate the product.

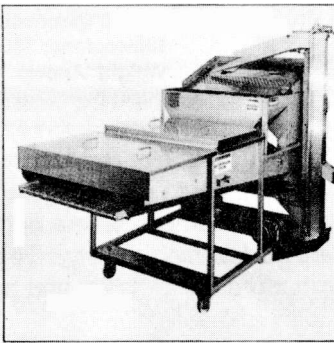
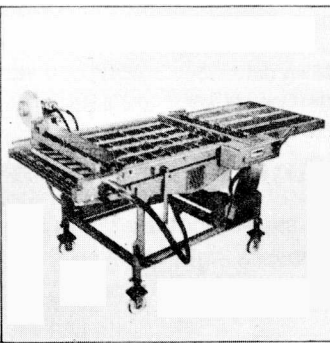
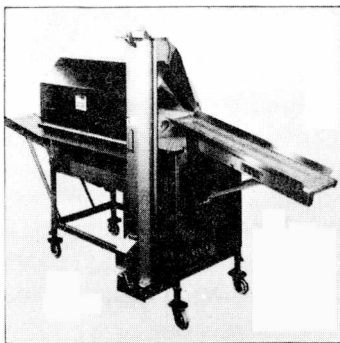
Japanese-style crumbs are a mixture of coarse and fine particles. The mechanical problem such a mixture creates is that of coating all sides of the product evenly with the same proportions of particle sizes.

Unless the applicator is correctly designed, the product will have fine particles on the one side and be sparsely coated with large particles on the other.

## **FLASH FRYING**

Frying completes the production phase of ready-to-serve portions. Heating of edible oil, a critical feature in flash-fry operations, is done three ways:

*Electrical*



*Rotary drum pre-dust applicator*

*Tempura batter applicator*

*Breading applicator*



*Food made attractive and appetizing through coating and frying.*

The electrical elements are encased in stainless steel tubes and manifold mounted within the fryer. Temperature is maintained by proportional stepping up or down, if some heating elements fail to function.

#### *Thermal oil*

The system consists basically of a remote oil or gas-fired boiler providing controlled temperature and low-pressure flow of a suitable heat transmission fluid into a heat exchange process which may be either internal or external.

#### *Steam*

This system also consists basically of a remote oil or gas-fired boiler providing a controlled temperature and low-pressure flow of a suitable heat exchange process which may be either internal or external.

Depending on the required frying temperature, a steam pressure of 20-25 bar is usually necessary.

Steam systems are not commonly used in smaller operations.

The new coatings have demanded greater efficiency of oil filtration to minimize FFA (free fatty acid), increase oil life and improve product quality. To give effective and economical results in the frying operation, the filtration system must: (1) be self-cleaning; (2) remove sediment continuously; (3) unload sediment without stopping the process; and (4) be designed to extract the size of particles generated by the process.

The author who is connected with the food processing equipment of the Alfa-Laval Convenience Food Division in Singapore, also mentioned a new generation of cookers, the hot-air ovens, which allow food products to be fully cooked, yet without the normally accepted cooking loss. Moreover, this cooking system does not use oil. Operating costs are therefore greatly reduced.

Source: Albert Dikhooff, "Developments in equipment used for coating and frying." **INFORISH International**, May-June, 1990.